

# *SAFETY PRACTICES*

Land Location and Boundary Section  
State Lands Commission



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## Table of Contents

Introduction .....	3
"Code of Safe Surveying Practices" .....	3
Distribution .....	3
Philosophy .....	3
Responsibilities .....	3
Survey Planning .....	3
Clothing .....	3
Safety Equipment, Personal .....	3
Traffic .....	3
Tools and Equipment .....	3
First Aid .....	3
Vehicle Operation .....	3
Operational .....	4
Legal Requirements .....	4
California Constitution .....	4
California Labor Code .....	4
California Administrative .....	4
CAL OSHA .....	4
State Lands Commission Responsibilities .....	4
State Lands Commission .....	4
Responsibility to Others .....	4
Safety Meetings .....	4
Tailgate Safety Meetings .....	4
Personal Safety Responsibilities .....	4
Individual Responsibilities .....	4
Party Chief's Responsibilities .....	6
Unit Supervisor's Responsibilities .....	8
Reporting Unsafe Working Conditions .....	9
Operational Safety .....	9
Animal Hazards .....	9
Construction or Forestry Operations .....	9
Cutting Tools, Hand .....	9
Digging Tools, Hand .....	10
Driving Tools, Hand .....	10
Electrical Equipment .....	10
Fence Crossing .....	11
Fire Hazard Areas .....	11
Heat Illnesses .....	11
Insect Bites and Stings .....	11
Medical Disabilities .....	11
Lasers .....	11
Lifting .....	12
Mountainous Terrain .....	12
Night Operations .....	12
Poisoning, Brush .....	12
Power Lines .....	13

## Table of Contents, continued.

Power Tools .....	13
Pressurized Spray Cans .....	13
Radio Transmitters .....	13
Railroads, Work Near .....	14
Sights, Survey .....	14
Signalling, Hand .....	14
Snakebite .....	14
Confined Space Work .....	15
Towers, Surveying .....	16
Traffic, Working in .....	16
Water, Drinking .....	17
Water Operations .....	17
<b>Vehicles .....</b>	<b>18</b>
Seat Belts .....	18
Accident Prevention .....	18
Basic Safety Rules of Operation .....	19
"Jumping" Dead Batteries .....	20
<b>Fire Prevention .....</b>	<b>20</b>
Regulations and Public Relations .....	20
Survey Planning .....	20
Gasoline-Powered Equipment .....	20
Electrical Equipment .....	20
Smoking .....	20
<b>Fire Control .....</b>	<b>20</b>
Equipment .....	20
Action .....	20
<b>First Aid and Supplies .....</b>	<b>21</b>
Kits .....	21
Written Information .....	21
Qualified First Aiders .....	21
<b>Temporary Traffic Control .....</b>	<b>21</b>
Definition .....	21
Policy .....	21
Purpose .....	21
Individual Safety .....	21
Method to Use .....	22

## SAFETY PRACTICES

### Land Location and Boundary Section

### State Lands Commission

#### Introduction

State Lands employees survey in many different hazardous environments. Rugged terrain, high-speed traffic, water borne work, tools used, and construction equipment are some of the elements that typify survey hazards.

Most people have one thing in common with many who have experienced an accident: they believe it could not happen to them. A meaningful safety program requires that each Survey employee acknowledge that, "It can happen to me." Each must also ask, "What is my responsibility?", and "What can I do to keep it from happening?"

#### "Code of Safe Surveying Practices"

**Distribution**—Each field employee shall have ready access to this Code.

**Philosophy**—Any survey operation shall not be considered as either so important or so urgent that this Code or any safe practice will be compromised.

#### **Responsibilities**

##### **A. Individuals—**

1. All field personnel shall have a practical working knowledge of this Code.
2. Each employee is charged by law to - (a) do everything reasonably necessary to protect life, safety, and health of everyone and (b) comply with all occupational safety and health regulations which are applicable to his job.
3. Promptly report injuries and accidents and unsafe conditions, tools, and equipment.
4. Report to work each day in a physical condition that will enable functioning with agility and alertness.

##### **B. Supervisors—**

Unit Supervisors are Responsible for—

1. Monitoring safety conditions and performance.
2. Instructing subordinates about policies and practices affecting them.
3. Not knowingly permitting an employee to work when his ability or alertness is impaired by fatigue, or other factors, so he or others might be exposed to injury.

**Survey Planning**—Safety shall be given top priority in the planning of all surveys. Planning shall include—

- A. A section on safety in each survey proposal which shall contain an analysis and appraisal of the safety conditions that may be encountered during the field work based upon the personal knowledge of a boundary staff member,

B. The safest time of day that the survey can be accomplished.

C. The optimum number of personnel to do the job (always use the "buddy" system).

D. The assignment of trained and qualified personnel for the more hazardous jobs.

**Clothing**—Each employee must provide and wear clothing and footwear that will provide adequate protection.

**Safety Equipment, Personal**—State-issued hard hats must be worn while exposed to vehicular and equipment traffic, falling or flying material, and any similar hazards. They shall also be worn when employees are within the R/W of a traveled road.

Red or orange vests or shirts shall be worn when exposed to vehicular or equipment traffic and when working within the R/W of a traveled road. Within railroad rights of ways, orange (or yellow) is to be worn in place of red.

Safety glasses, goggles, or face shields shall be worn when exposed to traffic, drilling and driving machines and tools, falling or airborne and wind-blown material, or other similar hazards.

Special safety equipment shall be provided and shall be used as required.

**Safety Training**—Tailgate meetings<sup>1</sup> shall be held on the job by each party or work group at least every ten working days. Supplementary meetings shall be held as required to prepare for imminent and especially potent hazards. Such hazards shall include, but not be limited to poisonous plants, snakes, insects, animals, mountainous terrain, high-fire-hazard areas, traffic, heavy equipment, water exposure, and high temperature.

Specialty training, such as "First Aid" or "Chain Saw Operation", shall be provided as required.

**Traffic**—Work, no matter how short the duration, must not be performed on or adjacent to the traveled way without proper protection. This includes attire, signs, flaggers, "lookouts", and or lane closures, as required to work safely.

**Tools and Equipment**—Only use the proper tool, in the proper condition, for each job. Do not operate equipment unless you have been trained in its use.

**First Aid**—Each party or working group shall include at least two certified first aiders. It shall be equipped with the Red Cross manual, *Standard First Aid & Personal Safety*, and an approved 16-unit, or larger, first aid kit.

**Vehicle Operation**—All operators of State-owned

<sup>1</sup>Note: See the topic "Safety Meetings", below.



vehicles must be trained in defensive driving. Each operator must drive defensively and observe all applicable traffic laws.

**Operational**—Do not enter ditches, trenches, conduits, or underground chambers until you are certain it is safe to do so.

Suspend operations when uncontrollable hazards develop. Resume work only when safe conditions have been restored.

When working in an unfamiliar environment, check with others about safe procedures.

Double your precautions when working at night.

## Legal Requirements

Humaneness and good employee relations "demand" safe working conditions for employees. (In addition, statutory law requires much from employers and employees, as well.)

**California Constitution**—Article XX, Section 21 requires employers to implement a policy which includes, "full provisions for securing safety in places of employment".

**California Labor Code**—Division 5, Part 1, Chapter 1 requires that, "Every employer shall furnish and use safety devices and safeguards, and shall adopt and use practices, means, methods, operations, and processes which are reasonably adequate to render such employment and place of employment safe and healthful. Every employer shall do every other thing reasonably necessary to protect the life, safety, and health of employees".

**California Administrative**—Code Title 8, "Industrial Relations" includes the General Industry Safety Orders and the Construction Safety Orders. "Section 1509, Accident-Prevention Program" of the Construction Safety Orders requires—

- A. Every employer shall inaugurate and maintain an accident prevention program. The program shall provide that capable, responsible supervisors shall make regular inspections of equipment and operations and take immediate corrective action to eliminate hazards directly under the control of the employer.
- B. The adoption and use of a "Code of Safe Practices".
- C. Monthly, or more frequent, meetings of first line supervisors to discuss safety problems and accidents that have occurred.
- D. Tailgate safety meetings at least every 10 working days for each survey party.

**CAL OSHA**—The California Occupational Safety and Health Act of 1973 was enabled by Assembly Bill 150. The basic purposes of this Act are—

- A. Assure safe and healthful working conditions for all California workers by enforcement of effective standards.

...tive standards.

- B. Help employers to maintain safe and healthful working conditions.

## State Lands Commission

### Responsibilities

**State Lands Commission**—Responsible for establishing a safety program which conforms to the spirit and the letter of CAL OSHA and all pertinent State laws.

**Responsibility to Others**—All S.L.C. organizational units, working units, and individual employees must strive to prevent any diminishing of the safety of others by any of our operations. Field personnel must be especially aware of the need not to create hazards when working on the property of others. Refer to and follow the guidelines given in the topic. Any special hazard(s) expected within a proposed field project will be detailed and an appraisal of the hazard(s) and safety measures to be taken, will be included in the survey proposal.

## Safety Meetings

### Tailgate Safety Meetings

- A. **Frequency**—An on-site meeting will be held on the first workday of any new project. If new or changing conditions require, meetings shall be held as often as necessary.
- B. **Topics**—Usually, the subject of the tailgate meeting should be pertinent to the survey party's current assignment. This meeting is separate from any other work instructions that are required for the day's work. The party chief may choose an appropriate topic relating to the current field project.

Now and then, devote the tailgate meeting to a discussion of how known injuries or accidents might have been prevented.

- C. **Documentation**—Each tailgate meeting must be documented on the Survey Party Report or on another form devised for that purpose. Show the meeting date, topic, those present, pertinent issues discussed, and the length of the meeting.

## Personal Safety Responsibilities

**Individual Responsibilities**—Every employee is responsible for his own safety and the safety of his co-workers.

- A. **Safe Practices**—Each employee shall learn the personal and group accident preventions and injury treatments that are described herein and abide by them. Safety procedures and rules are not optional. Deviations are not allowed without prior formal approval.

- I. **Knowledge and Location of Code**—Each employee shall have a practical working knowledge of the Code of Safe Surveying Practices.

All shall know the location of copies so they can be used for ready reference.

2. *Violations of Safe Practices*—Each employee shall be alert to possible violations of safety policies. If violations are seen and the employee cannot correct them, he shall report them to his supervisor.

**B. Operational Practices**—Each employee must routinely

1. Report unsafe conditions or practices. (See the paragraph Reporting Unsafe Working Conditions, below, in this topic.)
2. Promptly report all accidents and personal injuries to his supervisor.
3. Render or find aid, as required, for injured persons.
4. Be alert for hidden hazards.
5. Be alert for hazards created by changing conditions, either natural or man-made.
6. Shun horseplay and practical joking.
7. Store and secure all equipment and supplies when not in use. They must not be hazardous to persons or to vehicular operation.
8. Help in keeping vehicles and offices clean, sanitary, and litter free.
9. Set aside defective and unsafe tools and supplies for repair or replacement. (Report such problems to your supervisor.)
10. Carry gear such as plumb bobs, hand levels, and hatchets in sheathes. Do not carry such tools in pants pockets.
11. Heed all specific practices listed in the topic Operational Safety, below.
12. Avoid transporting in State vehicles or having or using on the job hazardous or potentially hazard-causing things. Some such items are fireworks, firearms and ammunition, intoxicating beverages and drugs, and pets.
13. Before acting, mentally check the safety of each action.
14. Face oncoming traffic when working on foot and near or on the traveled way. If unable to face traffic, have a co-worker, a "lookout", watch for you. It is advisable to face traffic from any work site within the right of way, especially when near, at, or below roadbed level.

**C. Safety Meetings**—

1. As required, attend safety meetings.

**D. Proper Attire**<sup>2</sup>—Each employee must personally provide—

1. *Footwear*—that provides protection and firm support for the foot and ankle, i.e.: Lace-up type field boots with good soles and heels are the recommended type of field footwear. Soft footwear with "deck soles", such as "athletic-type" or tennis shoes will be worn when surveying from boats. Low cut shoes or soft footwear may be worn in areas of pavement or on beach type surveys, where hazards presented in rural or undeveloped area are not present. It is highly recommended that special type lace-up "Logger style" boots be worn in heavily forested work areas to provide protection from hazards presented by timber operations or heavy undergrowth.

2. *Work clothing*—that provides protection from the sun's rays, heat, cold, and vegetation. Wear clothing that will help you keep from being injured or diverted from safely performing the job at hand.

**E. Personal Safety Equipment**—Each employee is furnished, as required, personal safety items which must be prudently and consistently used.

**1. S.L.C. Safety Equipment—**

- a. *Hard Hat*—A State-issued white plastic hard hat, with a chin strap, must be worn while you are exposed or are likely to be exposed to hazards to the head. Some of them are, moving traffic, construction equipment, falling or airborne material, forested or wilderness environment or similar hazards. Also wear it whenever you are working within the right-of-way of a traveled facility. (Knit or skullcap-type liners are also issued for cold weather work.)

Inspect the hard hat shell and cradle at least twice a year. If either becomes defective or deformed, replace.

- b. *Safety Vest*—Orange or red vests or shirts must be worn while exposed to hazards in Item a., above. ONLY orange or yellow vests or shirts are to be used while working on railroad rights of way.

- c. *Safety Goggles (Shatterproof)*<sup>3</sup>—Wear this "Mono-type" protection when exposed to flying particles, hazardous substances, injurious light rays, and the hazards listed in Item a., above. Also wear them when using such tools as Ramsets, chisels, and steel gads. Wear these safety goggles when exposed to blowing dust,

<sup>2</sup>Note: Avoid wearing rings, bracelets, necklaces, earrings or other geegaws that can hang-up on objects such as tools, brush and door handles.

<sup>3</sup>Note: Conventional eyeglasses and contact lenses do not qualify as protective equipment.

swirling sand, and other wind borne or machine blown materials.

2. *Special Issue*—In addition to "regular-issue" safety equipment, use such specialty items as

a. *Dust Respirators*—Use when there is a likelihood that you will breathe harmful dusts.

b. *Gloves*—Use when working in poison oak or brushing line through vegetation such as buckthorn, locust, and briars. Also use to protect against puncture, laceration, and splinter wounds.

c. *Hearing Protectors*—Whenever operating gasoline chain saws, jackhammers, and other very noisy tools, use hearing protection. Use when noise levels exceed the limits established in Article 105 of the General Industry Safety Orders. These limits show a maximum exposure of 140 dB peak for "impact" and "impulsive" noise. For "intermittent" or "continuous" noise various sound levels and limits are shown. The limits show, for example, a two hour exposure limit to a 100 dB sound level during an eight hour day.

d. *Chain Saw Safety Apparel*—Whenever operating a chain saw, special design protective arm gauntlets, gloves and leg protectors (chaps) must be worn by the operator.

e. *Safety Belts and Lines*—Use a safety belt and a life line when working on precipitous or slippery slopes, in trenches, in subsurface facilities and in confined spaces.<sup>4</sup> Also use them when on elevated structures which do not have guard rails.

f. *High-visibility Apparel*—When working in or close to traffic, wear—

i. *At Night*—A reflective vest with white reflectorized tape on all sides. Wear this over either white coveralls or yellow foul weather gear.

ii. *In Wet Weather*—Yellow foul-weather gear. When this gear is worn during daylight (with good visibility), red or orange vests are not required except for flaggers.

F. *Physical Condition*—Each surveyor shall report to work each day in an alert, agile, and capable condition. You should be

1. *Healthy*—If you are ill, do not report to work. If you become ill on the job, do not continue

to work. Report to your supervisor and then get aid.

2. *Rested and Nourished*—Each surveyor must report for work prepared to perform an alert, accident-free, full shift of work. For most individuals this dictates 7 to 8 hours of sleep and a nourishing breakfast.

3. *Free From Influence of Drugs or Alcohol*—

a. *Drugs*—Whenever a physician gives you a prescription, inquire if the drug might impair your safe functioning. If any impairment might result, ask the doctor what you can and cannot do while taking the medication. Notify your supervisor.

Do not report for work if you are under the influence of nonprescribed narcotics. Also do not report for work if you have been taking any drugs, prescribed or otherwise, which diminish your alertness and your ability to react quickly and make sound judgments.

b. *Alcohol*—Do not report for work if you are under the influence of intoxicants. Also, do not report for work if any lingering effects from drinking intoxicants (such as a "hangover") would diminish your alertness and keep you from reacting quickly or would impair your judgment.

G. *Vehicular Operation*—Transportation surveying requires vehicular operation. To operate State vehicles an employee must

1. Possess a valid CALIFORNIA DRIVER LICENSE.

2. Attend a State Defensive Driving Training Program before operating any State equipment. This training shall be repeated at least once every four years.

In addition, all employees must heed the practices listed in the topic "Vehicles", below, and other practices that will help to prevent accident or injury.

H. *Accident Studies*—Participate or cooperate fully in determining causes and prevention of accidents and injuries.

*Party Chief's Responsibilities*—Each first line supervisor is responsible for the work methods and safety practices on his party. The party chief is in the best position to see that all safety rules and procedures are followed and that all work is performed safely. Do not attempt to delegate this responsibility. The party chief, himself, must ensure the use of the one best SAFE method for each operation.

A. *Code of Safe Surveying Practices*—

1. See that a copy of the Code of Safe Surveying

<sup>4</sup>Note: See "Subsurface and Confined Spaces Work" in the topic "Operational Safety", below.



Practices is always available to members of your party.

2. Enforce all elements of the Code.

B. *Job Planning*—

1. Give safety first priority in planning each survey.
2. As required for each job, develop additional safety practices.
3. Request enough personnel for safe surveying: for buddies, lookouts, flaggers, etc.
4. Insofar as possible, plan around hazards, especially life-threatening hazards such as traffic.
5. Avoid assigning party members to solo type tasks that isolate them from other party personnel. Try to have each member working with a buddy. (This is especially important in high hazard areas, such as along roads, and in remote desert and mountain areas.)

C. *Personal Equipment*—See that each subordinate possesses or has available required personal safety equipment. You must see that employees use this equipment as required. If an employee refuses to use required equipment, do not allow him to work. Dismiss him, without pay, for the rest of the day. Refer the matter to your supervisor.

D. *Party Equipment*—See that equipment and supplies are safe to use and submit a Survey Equipment and Materials Report for any hazardous material.

E. *Employee Orientation, Training, and Supervision*—

1. *New Employee*—

- a. Make certain the employee has been briefed and trained by the Survey Supervisor, as required in "Survey Supervisor's Responsibilities", below.
- b. Assign a storage area for the employee's personal safety equipment.
- c. Show the employee where the lists of medical aid, the first aid kit, fire extinguishers, and emergency flares (and or reflectors) are stored.
- d. Show the employee where and how all equipment and supplies are safely stored.
- e. Adequately orient and begin training the new employee in required work tasks before allowing him to work alone at individual tasks.
- f. Administer a road driving test if the employee is expected to operate State vehicles, even if only occasionally. Test the employee in a type of Survey vehicle he will be driving in the field. Do

not allow "Youth Aids" to drive.

2. *New Party Members*—Same as Items "b through d", above.

3. *All Party Members*—

- a. **Immediately** correct unsafe practices.
- b. If an employee refuses to work safely, for himself, for others, and with others—dismiss him without pay for the rest of the day. Refer the matter to your supervisor.
- c. If an employee seems to be under the influence of drugs or alcohol, do not let him work until it is apparent that he is free from any such influence. But if an employee is obviously under the influence, dismiss him, without pay, for the day. (If at all possible, have someone drive the affected employee home or have a family member or a friend come and pick him up.)

Refer any such incidents to your supervisor and take formal corrective action. This should begin with accurate and complete documentation of the incident. Do not make the documentation on the Survey Party Report.

- d. Continually monitor employee safety performance and attitudes.
- e. Keep them informed about accident prevention programs.

F. *Performance Review*—During an employee's formal "Report of Performance" and "Appraisal and Development" discussions, review his safety performance and his safety attitudes.

G. *Tailgate Meetings*—Conduct an on-site tailgate safety meeting with crew during the first day of any new project, and as often as new or changing conditions dictate. On any ongoing field projects, meetings will be held at least every 10 days or less as conditions require. (See the previous topic "Safety Meetings".)

H. *Accidents and Injuries*—

1. Promptly give or obtain aid for an injured person.
2. At all times, have at least two party members who have had certified first aid training.
3. Thoroughly investigate all accidents and injuries and take corrective action.
4. See that all required reports are promptly prepared and submitted.
5. Discuss employee's injury with doctor. Provide doctor with a description of injured's duties and alternate duties available. Thus, the doctor can deter-

mine when the employee will be able to return to limited or full duty. Ask the doctor when the employee will be able to return to work.

### *Unit Supervisor's Responsibilities*

#### *A. New Employee Orientation—*

1. *"Code of Safe Surveying Practices"*—Give employee a copy of the Code and allow him time to read and study it. Be available to answer any questions. Make certain the employee understands the spirit of the Code and its basic requirements. Each employee must understand the requirement of "being responsible for his own safety and the safety of others".
2. *Medical Aid*—Direct employee to visit his family physician or any physician conveniently located. Inform physician of work related injury (*Workman's Compensation*). Obtain and fill out form entitled "Employee's Claim For Worker's Compensation Benefits". Return completed form to Unit Supervisor.
3. *First Aid*—Tell the employee that first aid in the field is available from a qualified party member.
4. *Driver's Training*—See that all field personnel attend "Defensive Driver Training" within 90 days of employment.
5. *Hazards and Countermeasures*—Describe hazards the employee will probably encounter in his first assignments and protective measures he must take.
6. *Miscellaneous*—Brief the employee on
  - a. Medical care available through his employment.
  - b. State Compensation Insurance Fund benefits.
  - c. The role of the State Lands Safety Committee.
  - d. The supervisory accident investigation process and its purpose of preventing accidents.
  - e. Accident and injury reporting and their purposes.
  - f. His right to refuse to perform tasks that are dangerous or hazardous to his well-being and health.
  - g. His responsibilities in case of personal and motor vehicle accidents.

#### *B. Personnel and Routine Job Assignments*

1. Two or more members of each survey crew must hold a current first aid card and also be certified to administer CPR.
2. Assign trained and or especially capable personnel to parties working on jobs that require

hazardous tasks, such as

- a. Chain saw use.
- b. Scaling precipitous or slippery slopes.
- c. Driving on bad terrain or unimproved roads with conventional or with four-wheel-drive vehicles.
- d. Operating the S.L.C. work boat.

3. Keep highly allergic personnel away from jobs where poison oak, creosote bush or other toxic vegetation or substances cannot be avoided.
4. For parties working in high-snake-hazard areas, provide lists of places where antivenin can be administered professionally.
5. Before assigning a party to a new job, determine if unusual hazards might be met and preventive measures to be taken. Brief the party chief accordingly. Also, in high hazard areas, plan for and brief the party chief on such factors as "escape routes", hospital locations, ambulance service and rescue agencies.
6. Postpone surveys near slippery roads or roads that are extremely hazardous because of immediate or short-term conditions.

*C. Job Assignments Upon or Alongside Traveled Ways*—Before assigning these surveys to a party, determine which, if any, traffic controls are required to protect personnel and the public. Also, determine if extra personnel are required for flaggers, lookouts, etc., and assign personnel accordingly. (See the topic "Temporary Traffic Control", below.)

#### *D. Safety Training—*

1. Disseminate information to all personnel regarding
  - a. Conclusions about how recent injuries or accidents might have been prevented.
  - b. New safety equipment available.
  - c. New techniques developed that aid in safe surveying.
2. Provide sample tailgate meeting topics and outlines to party chiefs.
3. Schedule "safety" as a topic on the agenda of each Party Chief Meeting. Review some items of the Code at each meeting.
4. Schedule each employee to attend the Defensive Driver Training Program, once every four years.
5. As needed, see that party chiefs and other designated personnel are trained in the use of four-wheel-drive vehicles, chain saws, laser EDMs, etc.

#### *E. Safety Monitoring—*

1. Immediately correct safety deficiencies that are seen on jobs.
2. Periodically rate the safety performance of

- party chiefs. Include this in performance appraisals, and take corrective steps for any deficiencies.
3. See that adequate safety equipment is stocked.
  4. See that only safe supplies and equipment, such as gads and stakes, are issued. Correct any material that is unsafe.
  5. Review reports and corrective actions for vehicle accidents and personal injuries.
- F. *Formal Corrective Actions*—See that proper corrective action is taken whenever an employee refuses to work safely and follow safety policy or when an employee's performance is affected by the use of drugs or alcohol. Also, see that the employee is aware of and encouraged to use any professional assistance that is available through State Lands.
- G. *Return to Work Program*—Counsel with the State Lands Return-to-Work Coordinator on all cases of lost time from work-related illness or injury.
- Reporting Unsafe Working Conditions*—State Lands Policy is to provide safe and healthful employment. You must help by reporting unsafe conditions when they are noticed. Do not delay reporting. This will enable correction of the problem before accident or injury occur. (If you can safely correct the problem, do so! Do not wait for others to act.)
- A. *Methods of Reporting*—You (and all employees) have a moral obligation to protect yourself, your co-workers and the public by immediately reporting safety problems. Report unsafe conditions by
1. *Promptly Telling Your Immediate Supervisor*—Do not wait for a formal meeting or conference, such as a tailgate safety meeting. If you cannot safely correct an unsafe condition, immediately make it known to your supervisor. This is the first communication you should make. Your immediate supervisor often is in the best position to take corrective action or initiate it.
- If your immediate supervisor is not available, report to a secondary action initiator such as the State Lands Safety Officer.

## Operational Safety

### Animal Hazards

- A. Assume that all animals are potentially dangerous.
- B. Have owners secure hostile acting animals before entering enclosures containing such animals.
- C. Do not enter an enclosure with high fences if a hazardous animal is within.
- D. Carry a pointed lath or a range pole to ward off a potentially attacking animal. Retreat is usually

advisable but do not turn your back and run unless you can reach a haven before the animal reaches you.

- E. Do not approach, attempt to capture or kill or attempt to pet either domesticated or wild creatures. (This includes snakes and other reptiles.)
- F. Be especially wary of sick-appearing animals, animals with young, stallions, bulls, and guard dogs. Do not handle dead or seemingly dead animals, fowl, or reptiles.

### Construction or Forestry Operations

- A. *Before Starting Work*—Determine potential hazards from the natural environment, the public and the contractor's operations. Plan accordingly. Any potential hazards shall be discussed in the Survey Proposal.
- B. *During Work*—
  1. Be extremely cautious around heavy and fast-moving equipment, especially on haul roads and around equipment with limited driver visibility. Do not rely on the operator's visibility, judgment or ability. Make eye contact with the operator before walking in front of or behind any piece of equipment. Use lookouts as conditions dictate.
  2. Suspend survey operations when uncontrollable hazards develop, and
  3. Resume work only when safe working conditions have been restored.
  4. Display and use safety devices and gear as required and as needed for maximum safety.
  5. Notify the project coordinator of any unsafe operations or conditions on the project.
  6. Do not ride in or on contractor's construction equipment unless required by your job.
  7. Do not walk girders or along edges of raised platforms without guard rails unless safety nets are in place or safety lines are used.
  8. Do not work on or traverse any walkway, ramp or other elevated structure over 7.5 feet tall unless it has adequate railings, cleats or guards.

### Cutting Tools, Hand

- A. Use the right type and size of tool for each cutting operation.
- B. Keep all cutting tools sharp. Sharpen tools with a file that has a handle with a hand guard. Turn dull saws in for replacement.
- C. When not in use or carrying sheathe or store all cutting tools so cutting edges are not exposed.
- D. Do not use tools with splintered or loose handles.
- E. *Properly use each tool*—
  1. *Machetes and Sandviks*—Machetes are not issued or recommended for general use.
    - a. Sharpen machete blades only from six inches from the butt of the handle to



within two inches of the point.

- b. Use gloves and wrist straps, as required.
- c. Station cutting tool users at no closer than 10 foot intervals. Protect yourself by retaining this minimum safety zone.
- d. While chopping, if possible, lean forward.
- e. Always chop away from the body.
- f. Swing with a full swing, but do not overswing or swing too hard.
- g. Clear small vines, etc., before cutting larger vegetation.
- h. Right-handed
  - i. Right Foot Forward-When swinging downward toward the left or when swinging upward to the right.
  - ii. Left Foot Forward-When swinging downward toward the right or when swinging upward to the left.
- i. Left-handed, reverse the right-handed procedure.
- j. Do not use for heavy cutting.
- k. Use long-handled lopping shears for cutting thorny bushes and briars.

## 2. Axes and Brush Hooks—

- a. Clear away any impeding, light growth with a Sandvik before chopping.
- b. Allow ample space between adjacent choppers and keep other persons outside the area.
- c. Carry with the handle gripped behind the head of the tool and the cutting edge facing outward.
- d. For extended heavy brushing use a small chain saw instead.

## Digging Tools, Hand

### A. Picks—

- 1. Do not use a pick head that is either sharply pointed or badly blunted.
- 2. Make certain the head is "bound" tightly to a good handle before swinging.
- 3. Allow ample space for swinging.
- 4. Do not overswing on the backswing.
- 5. Wear eye protection when digging in very hard material.
- 6. As you swing, squat by flexing the knees so the pick handle will be horizontal when the point strikes the earth. (This will also keep the point away from your feet.)

### B. Shovels—

- 1. Use a round-pointed shovel for digging in hard earth.
- 2. Do not use the shovel in the same manner as you use a digging bar. Place the blade of the shovel on the earth and force it into the earth with your foot.

3. Keep one foot on the ground at all times.

4. Discard a cracked shovel; "dress" one that has a blunted blade.

5. Do not use the shovel as a pry bar.

### C. Digging Bars—

- 1. Work with the feet widespread.
- 2. Hold the bar in close to the body and lift and drop it vertically.
- 3. Keep the point sharp enough to do the job without having to lift the bar excessively high.
- 4. Do not use a bar that is bent.

## Driving Tools, Hand

- A. Use the right type and size tool for each driving operation.
- B. Check for defects before using.
- C. Do not use hatchets, axes and other woodcutting tools for driving or hammering metal.
- D. Avoid striking brittle or mushroomed metal with a hammer. Bits of steel might chip off and cause serious flesh or eye injuries.
- E. Use safety goggles when driving or cutting metals.
- F. Do not use tools with splintered or loose handles or with mushroomed or cracked heads. (This includes the driving tool and the implement being driven.)
- G. Allow ample space for the swinging required. When squatting, use either a short-handled tool, or keep the long handle from between your legs (groin injury can result).
- H. When swinging, have the handle horizontal when the face of the driving head contacts the object being driven. With long-handled sledges this requires flexing the knees to lower the body during the swing.
- I. Do not full-swing to drive objects that are more than waist high.
- J. Do not hold an object for someone to drive by full-swinging.
- K. When driving masonry nails, spikes, and stakes into A.C. pavement or very hard earth, use extra care. Be sure the object being driven is well started before releasing it and driving it with full swings of the hammer.

## Electrical Equipment

- A. See the paragraph Gasoline-Powered Equipment under the topic "Fire Prevention" in this section.
- B. Only use portable electric hand tools that are double-insulated or that have a grounding wire. Do not remove grounding wires or prongs.
- C. Do not use any equipment that has cords with broken insulation or damaged plugs or sockets.
- D. Do not use electrical equipment when you or the equipment are standing in water or

on saturated soil.

### Fence Crossing

- Use gates, when possible, and avoid crossings. Carry keys for State R/W fence locks.
- Do not attempt to carry anything when climbing on or over obstacles.
- Cross barbed wire fences at the center of a span and have a co-worker hold the wire(s) for you.
- When stepping over a barbed wire fence, lay a piece of heavy canvas, such as an empty materials bag, over the top strand.

### Fire Hazard Areas—See the topics

"Fire Prevention and Fire Control" in this section.

**Heat Illnesses**—Heat exhaustion, heat stroke, and heat cramps can result from the summer heat in any part of the state.

### A. Preventive Measures—

#### 1. Employees—

- Wear a light colored head covering (a hard hat when required) that allows free air circulation.
- Wear light colored, loose-fitting clothing that minimizes skin exposure.
- Drink enough fluids.
- Replenish salt lost by perspiration. Do not overdo it. Salt acquired in a normal healthful diet is usually sufficient.

#### 2. Party Chief—

- Provide a constant, readily-available supply of potable water.
- See that employees wear proper attire.

#### 3. Unit Supervisor—When heat is extreme and the survey requires considerable exertion, schedule work for cooler times of the day.

### B. Diagnosis—

Symptoms	Heat Cramps	Heat Exhaustion	Heat Stroke
Dizziness.....			perhaps
Cramps, severe.....	X		
Headache.....		perhaps	X
Nausea.....		perhaps	perhaps
Perspiration, profuse.....	X	X*	
Pulse, rapid.....			X
Skin, dry.....			X
Skin, pale and clammy.....		X	
Temperature, high.....			X
Tired.....		X	
Unconsciousness.....		rare	often*
Vomiting.....		perhaps	perhaps
Weakness, extreme*.....		X	

\* = In severe cases

C. **Treatment**—Refer to the Red Cross manual, Standard First Aid & Personal Safety, for specific first aid measures and for more detailed symptoms. If aid is required and you do not have the Red Cross manual, treat the symptoms.

- Protect the patient by shading or taking indoors.
- Make the patient lie down and rest.
- Replenish lost body fluids by giving, if conscious and able to drink, a half-teaspoon of salt in a half-glass of water, as tolerated. Repeat at 15 minute intervals for three or four doses. (Usually for "exhaustion" or "stroke".)
- Cool extreme temperature by unclothing and freely sponging patient with lukewarm water or alcohol. Lower to 103°F and maintain at least that low. (A pulse rate of 110 per minute is generally indicative of a safe temperature.)
- Do not give stimulants.
- Massage or apply firm pressure to cramping muscles. Moist heat often helps.
- Seek medical aid if either "exhaustion" or "stroke" are indicated.

**Insect Bites and Stings**—Some persons are highly allergic to the stings and bites of insects. More people in this country die from bee stings than from snakebites. Any employee allergic to bee stings or other insect bites should inform the party chief and carry any medication necessary to relieve the reaction. Administration of the medication shall be discussed with the crew. If an allergic employee is stung or bitten—

- Take any prescribed medication.
- Apply a "Sting-Swab" from the first aid kit.
- Apply cold packs to minimize swelling, then
- Immediately take the victim to a medical facility for treatment.

Treat spider bites of either the Black Widow (hourglass) or the Brown Recluse (fiddle) spiders the same as snakebites.<sup>5</sup> However, do not attempt venom removal. Obtain prompt medical treatment.

**Medical Disabilities**—The survey party chief should be informed of any medical disability, such as diabetes, that may affect any crew member in the field.

**Lasers**—All laser EDM operators must be certified. Other Surveys personnel must be aware of these precautions.

- Do not look directly into a laser beam at close range.
- Do not look directly into a laser beam at any working range with binoculars or telescopes. (The intensity of the beam is magnified by the square of the power of the optical instrument used.)

<sup>5</sup>See the paragraph, "Snakebite", below.



- C. Do not allow prolonged exposure of the eye at any working range.
- D. Do not operate laser equipment unless you are a "certified" operator (or a trainee working under the direction of a certified operator).

#### **Lifting—**

- A. Properly lift only what you, or you and others, can safely handle. Do not be misled by bulk or lack of it. When you have any doubt about lifting, seek help or use a mechanical lifter.
- B. Beware of splinters, sharp protrusions, spiders, snakes, stinging insects and other such hazards.
- C. Before beginning to lift, plan how the lifting, moving, and setting down of the object are to be done. Be sure you have a safe, obstacle-free path of travel.
- D. If stooping is required, crouch as close to the load as possible.
- E. Firmly grasp the object, keeping the spine straight, and lift the object—pulling it in toward the pelvic area, then
- F. Reverse this process when setting things down.
- G. Always lift or lower objects with the leg muscles instead of with back muscles.

#### **Mountainous Terrain**

##### **A. Safety Lines—**

- 1. Use State-issued safety lines and belts whenever injury could result from work on precipitous slopes or slippery rocks. Use 3-strand, 3/4 inch manila line or equivalent line that has a work load rating of 1080 pounds and a breaking strength of 5400 pounds. This provides a safety factor of 6 for a 180 pound person.
- 2. Use knots that will not slip.
- 3. Be sure the line is anchored securely.
- 4. Wear a hard hat and eye protection when safety lines are required.

##### **B. Traversing Hazardous Areas—**

- 1. Test footing and determine a safe route before proceeding.
- 2. Avoid risky short cuts.
- 3. Do not run or leap down hill.
- 4. Use the "buddy" system in isolated areas.

##### **C. Rattlesnake Areas—**

- 1. In remote mountain areas and all snake-infested areas, you must have a snakebite kit and first aid supplies. During survey planning, determine the nearest medical facility where antivenin is available.
- 2. Each member who is isolated from the rest of the party must carry a snakebite kit.
- 3. Include chemical cold packs in the supplies.
- 4. See the paragraph "Snakebite" in this topic.

##### **D. Stream Water—**Do not drink stream water or

water from any untested source. Take proven drinking water with you.

**Night Operations—**Hazards become more potent and are harder to neutralize at night. Therefore, surveying will not be done at night unless reasonable daylight alternatives have been considered and proved to be infeasible.

##### **A. Survey Planning—**

- 1. Even more so at night, make safety the number one priority.
- 2. Allot extra time for all operations.
- 3. Make certain you have enough personnel, equipment, and supplies.

##### **B. Party Orientation—**Prepare all party members by proper briefing and issuance of adequate equipment.

##### **C. In Mountainous Areas—**

- 1. Always use the "buddy" system.
- 2. To guide personnel, use reflective material to flag safe roads and trails into work areas and to specific points.
- 3. Provide radio communication for each work area.
- 4. Double your precautions against
  - a. Snakebites in warm weather.
  - b. Fires in dry seasons.

##### **D. In Traffic—**

- 1. Nighttime surveys on traveled transportation facilities shall be considered as last resort surveys.
- 2. Include public safety in survey proposal.
- 3. If traffic promises to be particularly hazardous, seek assistance from the governing agency in charge of roads or from law enforcement agencies.
- 4. At night, have all personnel wear light colored clothing and reflective garments or devices when working anywhere that vehicles are likely to be moving.

##### **E. Public Relations—**Night surveys can disrupt traffic and arouse the curiosity of local residents. If this seems likely, notify local law enforcement agencies and the Highway Patrol. Consider giving advance public notice through local news media.

Note: Notification of news media should be done by the S.L.C. Executive Office.

**Poisoning, Brush—**Medical authorities agree that avoidance is the best prevention for poison oak (*Rhus diversiloba*) dermatitis. Avoidance can be difficult because dermatitis can result without the plant having been touched. Rhus-sensitive people can react, often severely, from contact with implements, clothing, and other objects that have touched poison oak brush.

Some ultra-sensitive people have reacted from sitting on vehicle seats where others have sat after being

exposed to poison oak. Family members have reacted after handling "oak" contaminated clothing. But, much can be done to help in the fight against the "oak."

#### A. Preventive Measures—

1. Keep highly allergic employees away from poison oak in all seasons of the year. Dermatitis can result from barren bushes, or vines, as well as from fully-leafed plants. Also, keep sensitive employees away from any exposed material. Often, machetes, tapes, and brush hooks have the toxic, oily resin from poison oak on them.
2. Adopt a survey plan which minimizes exposure.
3. Be able to recognize the plant and thereby better able to avoid it.
4. Encourage immune<sup>6</sup> or less susceptible employees to substitute for allergic employees whenever intermittent exposure occurs on a given project or task.
5. Wear long sleeves and gloves to minimize contact with the plant. Close cuffs and collars by taping. Wear State-issued, disposable paper coveralls and work suits of white or fluorescent orange for extra protection if available.
6. Use sprays and creams (or whatever works for an individual) before and after exposure.
7. Wash immediately after exposure. If exposure is continuous, stop every two hours, or more often, and wash.

If rubbing alcohol is available, apply to the washed areas. Rinse with clear water.

8. Change clothes and wash boots each day after exposure. Use a strongly-alkaline laundry soap, such as Fels Naptha, for cleaning work apparel. (Dry cleaning is the one safe method for cleaning the clothing of highly sensitive persons.)
9. Clean "contaminated" tools with the commercial cleaning fluid perchlorethylene or very strong laundry soap. Only use cleaning fluid out-of-doors. Wear neoprene or other water-proof gloves with either cleaning agent.

#### B. Treatment—When every precaution is still not enough and dermatitis develops

1. Use medications which are made specifically for poison oak dermatitis.
2. If the severity of the dermatitis warrants or if it persists, see a doctor. It is best to go to a dermatologist.

Poison oak is not the only plant which triggers dermatitis. In desert areas, avoid contacting grease wood (or creosote bush) and encelia. Some persons are allergic to these plants, and the reaction is similar to that

caused by poison oak. Precaution and treatment are the same as for poison oak.

#### Power Lines—Regard all power lines as dangerous.

- A. *Contact*—Avoid actual contact with or possible arcing to any equipment from electrical lines. In damp conditions double your precautions. To establish minimum clearances between equipment or persons and high voltage lines, see Article 86, Electrical Safety Orders, Title 8 of the California Administrative Code. These clearances range from 10 feet at 750 volts to 42 feet at 1,000,000 volts.
- B. *Taping*—Do not tape across canyons and terrain where a tape might possibly be pulled up into or lowered atop a power line. Use an EDM or another form of tachymetry instead of taping.
- C. *Power line Elevations*—Do not make a "direct" measurement of the height of a power line, even with a fiberglass rod. Triangulate these vertical distances.

#### Power Tools—Power tool usage requires maximum alertness and adequate training.

- A. *Training*—Employees must be given proper instruction before being allowed to operate such equipment as chain saws.<sup>7</sup> Do not operate a power tool unless you have been trained in its use. To legally operate a cartridge-actuated Ramset, you must possess an operator's card.
- B. *Operator and Co-Worker Protection*—Eye and hearing protection shall be used where chain saws, jack hammers and Ramsets are operated. Such protection must also be used by helpers. Nearby co-workers must use eye protection. They also must use ear protection if the noise levels specified in Article 105 of the General Industry Safety Orders are exceeded. See Item E2d in "Individual Responsibilities" in the topic "Personal Safety Responsibilities", above.

**Pressurized Spray Cans**—Serious injuries and costly cleanup have resulted from improper handling of pressurized spray cans.

- A. Do not puncture or incinerate.
- B. Store at temperatures lower than 120° F.
- C. Do not carry in vehicular passenger compartments.
- D. Dispose of through local refuse disposal systems. Do not discard any spray can in a receptacle that is normally accessible to children.

#### Radio Transmitters—

Mobile radio transmissions can set off explosive charges.

<sup>6</sup>Note: Personnel who are expected to operate chain saws shall not be allowed to do so until they have completed, as a minimum the CHAIN SAW OPERATION COURSE.

<sup>6</sup>Note: Be aware that immunity can disappear, especially, it seems, with repeated exposure.

If you are near blasting operations, always check with the blasting supervisor before transmitting any messages.

**Railroads, Work Near**—Guidelines used when working within an "operating right of way" are for the safety of the surveyor and the railroad. These general rules are:

- A. Always be alert around railroads. Railroad equipment is not always heard, especially if there is other noise. If a railroad car or locomotive is coasting, or if a train is moving slowly, hearing alone might not provide adequate protection. When necessary, use a lookout.
- B. Never crawl under stopped cars, and do not cross tracks between closely-spaced cars. They might be bumped at any time. (The engineer and the brakemen work only one side of the train.)
- C. Avoid any use of the color red. To a trainman, red means "immediate danger" and "STOP", without exception. Surveyors **MUST NOT** wear red vests or clothing when working near rails. Instead, wear yellow or international orange. Red markers, flagging, or lights shall not be used for any reason.  
Normally, do not use flares on highways at railroad grade crossings. Use flares if unmovable, injured persons or disabled vehicles are on the tracks. Also use them if you have found a condition that could derail the train.
- D. Do not leave protruding stakes or any holes within 10 feet of the center line of the tracks.
- E. Do not park vehicles within 10 feet of the tracks; train crews need this area for their operations.
- F. When taping across railroad tracks, support steel tapes above the rails at all times. The contacting of both rails at once by a steel tape can activate signals. In switching areas steel tapes can activate signals even when laid parallel to the rails. Therefore, only let nonmetallic tapes be grounded.
- G. Do not leave instruments or other equipment unattended, on or near tracks.

**Sights, Survey**—Do not leave red heads, concrete filled sight cans, or other similar sights where they might damage vehicles or be hazardous to pedestrians. All sights or points of any kind, both permanent and temporary, shall be guarded in a manner which protects the public as well as the survey point.

#### **Signalling, Hand**

- A. Do not use red flagging or red targets for signalling when working in or near traffic. Such signalling might confuse motorists.
- B. Be wary of using the standard surveying hand signals if they might confuse motorists.

**Snakebite**—Snakebites of surveyors are quite rare. Yet, the dread hazard of rattlesnakes abounds through-

out California. Even if preventive measures fail, current knowledge and treatment offer the best prognosis ever for snakebite victims.

A. Precautions—Though seemingly rare, poisonous snakes annually bite 6,500 to 7,000 Americans. The excellent record of S.L.C. surveyors can be maintained by continued vigilance. Include these precautions in your prevention program.

1. Always assume snakes are active (even though they are not usually active below 40° F). Do not relax your vigil on sunny winter days.
2. Do not make "solo" trips across snake country which is remote from habitations and frequently used roads. Use the "buddy" system on such jobs.
3. When traversing brushy or grassy terrain, use a "decoy" such as a level rod or a lath, alongside your legs. Walk heavily to create vibrations that can be felt by snakes. (A snake does not hear.)
4. Walk away from the shaded side of clumps and bushes when the weather is hot and sunny.
5. Step atop logs and large rocks, instead of stepping over them and into unseen areas. The safest policy is to walk around such obstacles.
6. Do not jump down from overhangs onto areas where snakes might be hidden from view.
7. Avoid steep climbs where a snake, uphill from you, could strike the upper portions of your body. Bites on the torso, the neck, and the head are much more damaging and more difficult to treat than those on the limbs.
8. Never climb vertical or near vertical faces where hand holds on unseen areas above your head are required.
9. Do not attempt, under any circumstances, to capture snakes!!
10. Do not try to kill a snake unless its presence, in that place, is or might be a positive threat to safety. (In a snake's natural environment ecological balance depends on its existence.)
11. Avoid likely snake areas such as small rodent trails or pack rats nests.
12. When necessary to move low-lying logs, large rocks, and boards, use a pry bar, not your hands.
13. Double your precautions at night, especially in warm weather.
14. Keep vehicles near your work area for rapid transport if snakebite should occur.
15. Have a snakebite kit and a chemical cold pack with each isolated employee. When possible, maintain radio contact with the isolated employee.



16. Know the location of the nearest medical facility where antivenin is available and the quickest route there.
  17. Do not collect rattles. A fine and highly abrasive dust often accumulates inside the rattles and can cause lasting damage to the eyes.
  18. Wear high leather boots or snake leggings in high-hazard areas.
  19. Remember that rattlesnakes do not always signal their presence by rattling.
- B. Treatment**—Venom is not always injected when a poisonous snake bites. Indications that a victim has been envenomed are immediate: instantaneous and severe pain, swelling and discoloration, a prickling sensation may be felt about the face, especially the lips. A minty or metallic taste is a common complaint following some rattlesnake bites. Look for these symptoms before beginning any attempts at venom removal (Step 7). Always follow Steps 1 through 6.
1. **Identify**—Do not attempt to kill the snake. Rattlesnakes are the only poisonous snakes in California. The fang marks (usually two but sometimes one if the bite is a "near miss"), the rattles (if not previously lost), and the snake's markings and coloration are sufficient identification.
  2. **Immobilize**—Curtail all possible movement by the victim (physical activity is quite detrimental). Reassure him to relax him and slow his circulation. Keep the bitten area below the level of the heart if the bite is on a limb.
  3. **Impede**—Restrict circulation. Immediately apply a flat constricting band (belt, kerchief, etc.) two to three inches above the wound and above any swelling (between the bite and the heart). It should be loose enough so you can insert a finger beneath it, without force. If it is any tighter than this, it can cut off circulation. Leave the band in place. Loosen only if swelling makes the band too tight. Do not use a boot lace or a narrow string as a constricting band. Do not attempt to use a tourniquet if the bite is on the face.
  4. **Cleanse**—Thoroughly cleanse with antiseptic, then
  5. **Cool**—Apply cold packs, either ice wrapped in cloth or chemical cold packs. Do not tightly bind them to the skin. Once a cold pack is applied leave it on up to an hour or until medical aid is reached. Do not apply and remove, apply and remove. This causes a "pumping" of blood in the area instead of restricting circulation. If a cold pack must be removed, do so gradually. This prevents rapid

venom dispersal from the bite area.

6. **Carry**—If possible, carry the victim to a vehicle then drive him to a medical facility where antivenin is available for injection by qualified medical personnel. Have a preplanned route to the facility.

**THE PROCEDURE IN [STEP 7], FOLLOWING IS TO BE USED ONLY AS A LAST RESORT AND ONLY WITH THE APPROVAL OF THE VICTIM.**

7. **Cutting**—Avoid incision for attempting venom removal, if possible. Conditions could dictate the need for on-the-spot venom removal. Cold packs might not be available. Location, lack of transportation, place of the snakebite on the body and condition of the patient might be less than optimal. If such conditions exist, do not delay incision and venom removal.

- a. Sterilize the fang wounds and a scalpel or a sharp knife.
- b. Make one straight **SUPERFICIAL** incision that connects both fang marks. Extend the cut 1/4 inch beyond each puncture. Deepen the cut through skin and fat but NOT into muscle, tendons, or nerves. Cutting might be easier and safer if the skin is pinched up. Do not make cross incisions.

*Cut most carefully.*

Note: If the incision is crosswise to veins, tendons, and muscles—make sure the cut is *superficial only*.

- c. Squeeze venom gently from the incision with the fingers for 20 to 30 minutes (or for the time it takes to reach medical aid). Do not use suction with the mouth. The human mouth is far from being aseptic and infection could easily result.

**ACTIVITY RESTRICTION, CONSTRICTION, CLEANSING, COLD PACK, AND ANTIVENIN INJECTION** are primary considerations for snakebite treatment.

Up to 98 percent of the venom can be kept at the site of the wound for a full hour. Keep the patient calm and immobile. Apply a constricting band and cold packs. Leave them in place.

#### **Confined Space Work**

##### **A. General—**

1. Use ladders for places and situations that are difficult to enter or reach.
2. On sloping concrete slabs and hard earth slopes, be cautious of slipping on loose sand and grit.
3. Be just as cautious on wet and slimy concrete channel bottoms.
4. Beware of rattlesnakes and spiders in man-

holes, trenches, sewers, and drains.

5. Have an outside observer, a buddy, in constant touch while subsurface work is in progress.
6. Even though all other precautions are taken, use a lifeline whenever cave-ins or asphyxiation are at all possible.

**B. Open Excavations—**

1. Do not stand near, enter, or work in a trench if it is not adequately shored or properly sloped.
2. If a trench is less than five feet deep do not enter if ground movement appears possible.
3. Do not park vehicles near the edges of excavations.

**Towers, Surveying—**The term "tower" refers to both an "inner" and an "outer" tower. The inner tower supports a piece of surveying equipment over a survey mark. The outer tower supports personnel as they use or maintain the equipment on the inner tower. In this topic the primary emphasis is on the outer, personnel-bearing tower.

**A. General Guidelines—**Erection and use of surveying towers shall follow the guidelines given in—

1. *Bilby Steel Tower for Triangulation*.— Publication 6 of the Coast and Geodetic Survey.
2. *Construction Safety Orders*.— Articles 14, 16, 21, 22, and 24 of the California Division of Industrial Safety.

**B. Tower Design—**

**1. Homemade—**

- a. *Height Limit*—25 feet.
- b. *Design Adequacy*—Follow the guidelines in the Construction Safety Orders. In addition, the design of any homemade tower over 15 feet tall shall be approved by a registered civil engineer.

2. *Ready-made*—Any ready-made tower shall be equal to or better than the "Bilby" tower in structural soundness, stability, and other safety features.

3. *Railings*—In accordance with the Construction Safety Orders any personnel platform that is 7'-6" or higher shall have a safety railing. In addition, any lower-height tower shall have a safety railing if personnel safety so dictates.

**C. Tower Erection—**"None but workmen skilled in the erection of scaffolds or false work and their helpers shall be so employed, and the work shall be under the supervision of a man with proper experience and attitude for securing a safe installation"—Article 21 of Construction Safety Orders.

Generally, S.L.C. personnel will not be used for erection of towers over 25 feet high. Taller towers shall be erected by NGS personnel or by

erecting contractors.

**D. Tower Use—**

1. Stay off towers if you are afraid of heights or if a tower is unstable.
2. Provide and use ladders in conformance with Article 25 of the Construction Safety Orders.
3. Stay off tower members—climb only on ladders provided.
4. Always keep both hands and arms and both feet and legs free for climbing.
5. Do not carry heavy, bulky, or cumbersome loads on your back.
6. Test hand holds, footing, and tower or ladder steps on each step, up or down.
7. Climb cautiously, without haste.
8. Keep at least one hand and one foot on solid support at all times.
9. Make sure the platform has railings, if required.
10. Leave before an approaching storm reaches a tower.
11. Stay off towers during wind, rain, sleet, snow, and electrical storms.
12. Do not climb a tower when ice, snow, or any other matter will make climbing and occupying the tower hazardous.
13. Stay away from towers during wind and electrical storms.

**Traffic, Working in—**(Also, see the topic "Temporary Traffic Control" in this Section.)

**A. Required "Free Space"—**Maintain at least 6 feet of space between moving traffic and your work area. This includes work on shoulders as well as on the traveled way.

**B. Face Traffic—**When working on the traveled way of divided roads or on the shoulders of highways, face oncoming traffic at all times or be guarded by a co-worker, a lookout. When working in a zone between two-way traffic, stand parallel to the traveled way, and use a lookout.

**C. Move Deliberately—**Do not make sudden movements that might confuse a motorist and cause him to take evasive action or panic, stop, and cause an accident.

**D. Signal Cautiously—**Carefully and deliberately use surveying hand signals. Do this so they will not be mistaken for a flagger's direction to motorists or confuse or startle them. Use radios if available.

**E. Use Required Control Devices—**(See the topic "Temporary Traffic Control", in this Section.)

**F. Avoid Interrupting Traffic Flow—**

1. Use off-set lines as much as possible.
2. Minimize the crossing of traffic lanes. On high-speed, heavily-loaded highways, do not try to walk or run across traffic lanes. On



freeways with wide shoulders and medians, cross in a vehicle. If necessary, go around by way of ramp, surface street, and ramp to assure a safe crossing.

3. If traffic lanes must be crossed on foot, wait for a natural "break" in traffic. A "break" is defined as all lanes clear.

#### G. Nighttime Work—

1. *When Allowed*—Except for special surveys or because of "impossible" daytime conditions, surveys on or adjacent to roads shall be done only during full daylight.
2. *Use of Signs and Cones*—If a survey must be done at night, illuminate all advance warning signs. Reflectorize or illuminate all other signs. Cones must be internally illuminated and fitted with reflective sleeves. On high-speed roads this control must be set up by Caltrans Maintenance or by a contractor. Contact the Caltrans District Manager.
3. *Personal Attire*—All personnel shall wear orange vests and reflective accessories on or over the vests or other clothing as required.
4. *Flaggers*—In addition to other requirements, the stations of any flaggers shall be so illuminated that each flagger is clearly visible to approaching traffic.

H. *Carrying Equipment*—When walking parallel to traffic, be careful to keep level rods, range poles, etc., from extending into a lane of traffic.

I. *Other "Attention-Grabbers"*—Avoid working near moving vehicles, especially on high-speed roads, when the attention of motorists is diverted from you or "your" roadbed. Be especially wary when there are "competing" activities; such as vehicular accidents, maintenance activities, and construction operations; or distracting objects on or along "your" side or the opposite side of the road. Do not work within 2,000 feet of such attention-grabbing activities or objects.

#### Water, Drinking—

A. *Containers*—Use only clean containers which have been designed and used only for drinking water. Fill only with fresh water. (Cases of hepatitis have been traced to dirty and improperly maintained water containers.) Do not use for cooling or storing canned beverages, juices, etc.

B. *Cups*—Use disposable drinking cups.

C. *Ice*—If ice is added to the water, it shall be transported to the water can in a sanitary wrapping or container.

*Water Operations*—When surveyors are exposed to the hazard of drowning, they shall be supplied either

Coast Guard-approved life jackets, or ring buoys with lifelines, or lifelines, or any combination of the three. Lifelines must be equal to or stronger than 1/2 inch diameter manila. Manila or nylon are preferred because they remain flexible even when wet. Avoid the use of sisal-fibered lines. Make certain that any line used is sound and not rotten.

Anytime boating operations are necessary this topic will be addressed in the survey proposal. Additionally the Boating Instructor will be consulted during the survey proposal process for input relative to safety and operations.

#### A. State Lands Work Boat—

1. The work boat is to be operated only by S.L.C. certified Boat Operators.
2. Follow the instructions of the Boat Operator. The authority of the Boat Operator transcends that of all passengers.
3. You are required to wear a life preserver at all times while aboard, no exceptions.
4. Do not assist unless asked to do so by the Boat Operator.
5. Remain seated while under way.
6. It is the responsibility of the Boat Operator to supervise the distribution of cargo, determining the safe load for the operating conditions, enforcing safety, assigning seats to the passengers, and informing the passengers of necessary safety precautions.
7. In the event that any passenger has back problems, advise the operator so that appropriate seating can be assigned.
8. Soft soled shoes are required.
9. The area forward of the wind shield is for cargo only, it is not a passenger area.
10. Trailering (towing) the State work boat is the sole responsibility of the Boat Operator assigned to the project. This task is not to be delegated to anyone except a certified S.L.C. operator.
11. **NO SMOKING** is permitted while on board the State work boat.

#### B. In Other Boats—

1. Wear a life jacket at all times.
2. Wear sneakers.
3. Use only safe boats.
4. Follow the common rules of boating safety.
5. Only use experienced Boat Operators who have been trained in boating safety.
6. Work with a buddy.
7. Do not overload a boat.

#### C. In the Water—

1. Do not wade barefoot. Wear athletic shoes to protect against cuts, cold and water.
2. Work with a buddy.

3. Wear a life jacket or life belt if the water is over knee-high or if you are working in surf waters.
4. *In Still Waters*—
  - a. Limit wading to waist-deep locations. Wear athletic shoes and life jacket.
  - b. Probe with a pole for holes and soft ground before proceeding.
5. *Wading In Moving Water*—Do not wade if—
  - a. The water is more than mid-thigh-high.
  - b. The product of stream velocity in f.p.s. and stream depth in feet equals ten or more.
  - c. Footing is difficult to retain because of any or a combination of stream velocity, streambed roughness, or slipperiness, unless, a tautly stretched lifeline is used as a hand rail.
  - d. Doubt exists as to safety.
6. *Along Shorelines*—
  - a. *Ocean Shores*—
    - i. Wear athletic shoes even if you are working only along the edge of the surf.
    - ii. Preferably schedule work at low tides. Be cautious of changing tide conditions that can trap the unwary.
    - iii. Do not work in the surf unless you are adept at ocean shore swimming and have on a life jacket or belt.
    - iv. Do not work in a heavy surf.
    - v. While working on groins or offshore rocks be on the lookout for rogue waves.
  - b. *Inland Shores*—
    - i. Wear rubber or leather boots for snake protection.
    - ii. Do not walk on floating debris in reservoirs or debris basins.
    - iii. Be cautious of recently puddled trenches and dredging fills.

## Vehicles

In addition to this text, see the topic "Personal Safety Responsibilities" in this Section.

For Four Wheel Drive Vehicle and Winch Operation see the following Special Publications: "Off-Road Driver's Handbook", Robert Ames, 1982, Del oeste Press;

"Off-Road Handbook", Dick Cepek, Darwin Publications;

"Four-Wheel-Drive Vehicle, Operators Instructions", State of California, Dept. of Water Resources, June, 1982.

The key to safe driving is defensive driving. Many accidents involving State vehicles have legally been the other party's fault. However, some of these accidents

could have been prevented if the State driver had been driving defensively.

**Seat Belts**—Use of seat belts is mandatory for drivers and passengers in State-owned vehicles and in private vehicles used on State business.

**Accident Prevention**—The majority of State vehicular accidents are of three types. They are—backing, colliding with the vehicle ahead, and being struck from the rear.

**A. Backing Accidents**—These accidents can be prevented by a few preventive measures:

1. Park whenever possible so backing is not necessary.
2. Never back without first checking to the rear. Dismount and personally check if in doubt. (See Item 5 below.)
3. Check mirrors for maximum visibility.
4. On trucks, use "fish-eye" mirrors. These mirrors are very helpful.
5. When visibility is limited, use a second person to provide guidance.
6. Unless parking parallel, do not back while in a traffic lane.
7. Do not back into a traffic lane unless adequate visual checks are made.

**B. Rear End Collisions**—Prevent rear end collisions by—

1. Following at a safe distance.
2. In inclement weather, increasing the following distance to allow for changes in conditions.
3. Observing conditions as far ahead as possible.
4. While driving, constantly checking for clear areas for evasive action.
5. Paying attention to traffic and its flow and staying alert.
6. Watching the mirrors, especially when stopping, slowing, or moving slowly.

If you are about to be rear-ended when your vehicle is motionless and you cannot take evasive action—firmly apply the brakes and press yourself against the seat back and headrest.

**C. Locked-Wheel Skids**—Avoid locked-wheel skids in panic stops. When rear wheels lock, traction on those wheels is diminished to the point that fishtailing often results. When front wheels lock, steering control is lost.

To avoid locked-wheel skids on slippery roads, rapidly pump the brakes. Press and release them quickly, once or twice a second. This gives alternate intervals of braking and steering control. Use gears to reduce speed, when possible.

**D. Speed**—Adjust your speed to the weather. Posted speed limits are for ideal conditions only. Reduce speed in rain, snow, or patchy fog. (In

heavy fog, park completely off the road, and turn off your lights. Otherwise, another driver might think you are still on the road and hit you from the rear.)

- E. **Alertness**—Do not drive unless you are physically and emotionally able to drive safely. All other driving hazards are compounded if you are not at your best, physically, mentally, and emotionally. Alcohol, fatigue, and illness slow reflexes. Some medicines impair driving performance. So-called "stay-awake" drugs can cause you to sleep with your eyes open.
- F. **Parking**—Unless vehicles are being used as protective barriers, park them completely away from highway traffic. If a vehicle must be parked within six feet of a traffic lane for more than 30 minutes and if the consequences of its being hit include possible injury to personnel—close the shoulder.

Insofar as possible, "properly park" a vehicle by following all legal requirements for any parking on public streets and highways.

**Basic Safety Rules of Operation**—In addition to the guidelines in the paragraph Accident Prevention, above, some basic rules to be used while operating or riding in a State vehicle are—

- A. Never let job urgency transcend safety.
- B. Use defensive driving techniques at all times.
- C. Allow for the limited visibility, acceleration, braking, and the large size of survey wagons and other heavily-loaded survey vehicles.
- D. Check on the safety of the vehicles before operating them, and do not knowingly operate a vehicle that is unsafe.
- E. Use seat belts and require all passengers to "buckle-up" before the vehicle is underway.
- F. Do not drink any alcoholic beverages prior to or during vehicular usage. Also, do not drive if you are taking medications, or drugs, or any substance that might impair your physical or mental faculties.
- G. Do not attempt to drive when any abilities are impaired.
- H. Do not stand in or on any part of a vehicle while it is in motion. Passengers must be seated with their seat belt fastened.
- I. Always park State vehicles in a safe manner and in a safe place. Avoid parking too close to the path of construction equipment or behind standing equipment. When possible, park so backing is not required. Also when parking a vehicle for a short time i.e., opening and closing gates, turn-off engine.

Routinely, double check to see that the hand brake is firmly set and the standard transmission

is definitely in "low" or "reverse" gear or in "PARK" if the vehicle has an automatic transmission. Chock the wheels when the parking site presents a possibility of a "roll-away".

- J. Never back without first checking the area to the rear.
- K. When in doubt or if tolerances are close, check overhead clearances.
- L. Keep all tools and equipment securely fastened in their designated places. See that this is done before moving a vehicle.
- M. Obey all traffic laws, signs, speed limits, and signals. (See Item V below.)
- N. Keep all vehicle doors closed except when entering or leaving the vehicle.
- O. Keep all survey truck cabinets closed when not in actual use.
- P. Do not overload vehicles, especially survey trucks, with personnel, equipment, or supplies.
- Q. Never exceed the intended capabilities of a vehicle. For example, do not use a two-wheel-drive vehicle in terrain where a four-wheel-drive vehicle is required.
- R. Have a rearview mirror in the cab of all survey wagons so passengers can be seen as they enter and leave.
- S. Do not use a haul road when fast-moving dirt movers are operating on the road.
- T. **Flammables, Caustics, and Acids**—
  - 1. Carry only when required.
  - 2. Do not carry in passenger compartments.
  - 3. Carry flammables in Type I or Type II safety cans. (Low volatile paint thinner may be kept in tightly-capped one-quart steel cans.)
  - 4. If wet-cell storage batteries must be used, carry them in tilt-resistant and splash-proof boxes. Secure this container in the vehicle so it cannot shift or slide. Provide adequate ventilation.
- U. Weekly, check the lug nuts on survey wagons.
- V. At all times obey the Vehicle Code. (The only time the Vehicle Code does not apply to public employees is when they are actually engaged in work on the surface of a highway. Moving a vehicle from one work location to another is not considered as working on the highway.)
- W. Before and after using a vehicle, report in writing to the carpool or to unit responsible any noticeable vehicular problems. Report tire defects and unusual wear and any mechanical problems that might have developed. Use Item X, below as a diagnostic procedure.
- X. **Vehicular Checks**—Verify the safety of each vehicle before operating it. This includes, but should not be limited to checking—



1. Tires for inflation and adequate tread.
2. All illuminating, directional, and warning lights, as well as gauge lights.
3. Windshield wiper operation and condition of blades.
4. Brakes and steering.
5. Mirrors.
6. Horn.
7. Door and hood latches, windows, seat belts, etc.
8. Trunk or other storage for jack, lug-wrench, reflectors or flares, tire chains where issued, safety flares, spare tire, first aid kit, and fire extinguisher if required.

A four-pound, dry-chemical Type A-B-C extinguisher shall be carried on each survey wagon. A four-pound Type A-B-C extinguisher must be carried on any other vehicle if it is used to transport flammables or if the vehicle, itself, might start a fire at an off-road work site.

- Y. Do not have more than three persons in the front seat of a vehicle.
- Z. Except in emergencies, do not push a vehicle with another vehicle.

**"Jumping" Dead Batteries**—See the booklet "Operation, Accident, and Emergency Service Information" in the glove box of each State vehicle.

## Fire Prevention

### **Regulations and Public Relations**—

- A. Obtain all required permits, and strictly heed all provisions.
- B. Daily, tell the agency having control of the land and the local fire-fighting agency where you will be working.

**Survey Planning**—Plan primary and alternate escape routes from the site of each operation.

### **Gasoline-Powered Equipment**—

- A. Equip chain saws, generators, jack hammers, and motor vehicles with approved mufflers and spark arrestors. These are to be installed by an authorized dealer or service contractor.

### **B. Motor Vehicles**—

1. **Off-road Parking**—Park motor vehicles so—
  - a. Fire roads are not blocked.
  - b. Gasoline does not leak from filler necks.
  - c. Hot engine or exhaust system parts do not contact flammable vegetation.
2. Inspect the undercarriage of motor vehicles to see that electric wires, exhaust systems, and fuel lines have not been ruptured by "high-centering" or by brush.
3. Do not leave a vehicle engine running while the vehicle is parked.

- C. Store and carry gasoline in Type I or Type II

safety cans with contents and "FLAMMABLE" marked thereon. (This applies to flammable liquids stored anywhere.)

- D. Fill gasoline tanks only in areas that are clear of combustibles. Do not fuel any equipment when its engine is running.
- E. Set portable generators so their exhausts are directed at areas which are clear of combustibles.
- F. Keep at least one two-pound dry-chemical Type A-B-C fire extinguisher with each portable combustion engine or at any operation that might cause a fire. (A long-handled round-point shovel might also be of value.)
- G. Set hot engines only on noncombustible materials and away from possible contact with dry grasses and other tinder.

### **Electrical Equipment**—

- A. Place batteries, dry cells, and wiring in cleared areas and on stable bases.
- B. Anchor unattended electrified signals and sights so wind and animals cannot knock them over.
- C. Do not use wires with frayed insulation or poor connectors.

**Smoking**—Lighted tobacco is forbidden in hazardous areas. Smoking is forbidden in the boathouse, the survey equipment room, while on board the State work boat, and while operating any electronic or optical surveying equipment. (Some controlling agencies allow smoking inside parked survey trucks with all windows and doors closed. Check with the official in charge.)

## Fire Control

### **Equipment**—

- A. **Shovel**—Have one or more long-handled, round-pointed shovels available at the site of each survey operation in hazardous areas.
- B. **Extinguisher**—One two-pound Type A-B-C extinguisher shall accompany each piece of gasoline-powered equipment.
- C. **Other**—Check with the controlling agency to learn if additional equipment is required.

### **Action**—

- A. **Extinguish**—If possible, extinguish the fire and do not let your escape route become blocked.
- B. **Escape**—If you cannot contain or extinguish a fire—
  1. Warn others nearby. Use the local frequency on your radio to warn others on your party and to warn other parties.
  2. Follow your planned escape procedures.
  3. Notify the proper fire-fighting agency. (If a district-frequency radio is available, call a base station.)
- C. **Evade**—Be wary of a fire which is anywhere near

your work area. If it might be a possible threat to you, go to a safe place until the threat has passed.

## First Aid and Supplies

### Kits—

#### A. Individual—

1. *Distribution*—Provide one kit for each employee who is isolated from the primary survey vehicle and fellow employees.
2. *Contents*—The individual kits should be packaged in airtight metal or plastic boxes or unit packages which will fit in canvas belt pouches.
3. *Location*—Store in the primary survey vehicle for use as required.

#### B. Survey Party—

1. *Distribution*—Provide one kit for each vehicle.
2. *Contents*—The container shall be dust and moisture proof. The approved contents will be the Bailey's First Aid Kwik Kits or equivalent.
3. *Location*—Store in each survey vehicle or boat. Place the kit in a visible and accessible place in that vehicle.

#### C. Surveys Field Offices—

1. *Distribution*—Provide one kit for each office or for each office unit that works isolated from other units.
2. *Contents*—The container and the contents shall be the same as for survey parties, except "Sting Swabs" are not required. A package of tongue depressors or an additional package of dressings or bandages may be used to replace the "Sting Swabs".
3. *Location*—Store where it will have optimum accessibility to all employees. Be sure it is easily-visible.

#### D. Snakebite Kits—Provide one kit for each employee who is isolated in an area where snakes are a hazard.

Store in the primary survey vehicle and issue as required.

#### E. Kit Inspection—All kits must be inspected periodically to assure adequate and usable supplies.

### Written Information—

#### A. First Aid Manual—In addition to first aid kits, each Surveys Field Office and survey vehicle shall have a readily-accessible copy of the current Red Cross manual, *Standard First Aid & Personal Safety*. This manual shall be kept in each vehicle.

#### B. Emergency Information—In most areas dialing 911 will contact most emergency service. If not in a 911 area, each Surveys Field Office and each survey party shall have readily-available the following emergency information:

1. List of emergency medical facilities in the area

and their telephone numbers.

2. List of medical facilities where antivenin is available.
3. Telephone numbers and addresses of ambulance service and rescue service.
4. Telephone numbers of the Highway Patrol, Sheriff's Office or City Police, and the local Fire Department.

**Qualified First Aiders**—At least TWO employees in each office and on each party shall have successfully completed the Standard American Red Cross First Aid and CPR Course. All employees are encouraged to take the course.

## Temporary Traffic Control

**Definition**—Temporary traffic controls for surveys are controls, of one shift or less duration, which are produced by the use of one or more of the following elements: portable warning control devices, prescribed procedures, and personnel serving in specialty safety functions, such as flaggers and lookouts.

In this context, "controls" does not necessarily mean the affecting of traffic flow or patterns. It embraces the philosophy that optimum safety for employees and motorists alike is often attained by more control of personnel actions and less, if any, restriction on vehicular movements.

### Policy—

#### A. Safety—The protection of employees and the public shall be the primary consideration when temporary traffic control measures are used.

#### B. Interference with Traffic—All reasonable measures shall be used to preclude interference with vehicular movement. Lane closures and roadbed closures shall not be considered until all other alternatives have been exhausted.

#### C. When to Use—Temporary control measures shall be used whenever surveyors work on or alongside travelled roads (including shoulders) or streets, wherever vehicles normally travel or park or are likely to travel or park. Generally, this part of the roadway will be between hinge points or between curbs. In addition, control measures shall be used when surveyors must work around moving construction equipment.

#### D. Duration of Control Usage—Temporary control devices shall not be in place and functional any longer than necessary. Therefore, breaks shall not be taken while devices are functional unless staffing is sufficient to allow staggered individual breaks. Also, lunch periods shall be reduced to the minimum time required.

**Purpose**—Temporary traffic controls are used to establish a "working area-of-protection" for employees.

**Individual Safety**—The safety of a surveyor often



rests on that employee's own shoulders. Whenever feasible each employee must obey the basic rule of facing traffic at all times. However, when working around traffic this is not always possible for surveyors. **If a surveyor cannot work facing traffic, the procedure should be changed or the order of work revised.** If this cannot be done then an exposed employee should be provided with a "lookout" who will serve as eyes for the vulnerable surveyor.

**Method to Use**--When traffic control is required, the controlling agency will be contacted, and their traffic safety requirements will be followed.

- A. Within State Highway right of ways, contact the local Caltrans District Engineers office, for information regarding permits and rights of entry.
- B. County and City streets and roads, contact the appropriate department responsible for traffic control.

Where there are no specific requirements the portion of the Caltrans Survey manual "Temporary Traffic Control" and "Surveying Without Traffic Control" will be followed.

Include with your survey proposal an analysis of the traffic safety requirements. Include the requirements by the controlling agency and if any lane closure, temporary diversions, etc., are needed. These task can require additional personnel and time to complete the work. Safety devices may be borrowed from some controlling agency.

## Other Survey Safety Publications

*Manual of Safety Standards for Land Surveyors*, Missouri Association of Registered Land Surveyors and University of Missouri, University of Missouri, 1973. State Lands Commission Map and Data Center Library Call Number 526.5.

*Caltrans Survey Manual*, California Department of Transportation, State Lands Commission Map and Data Center Library Call Number 625.7 TRA.